

REMARKS

Subsequent to issuance of the Notice of Allowance mailed December 7, 2000, concurrent with payment of the Issue Fee pursuant to this Notice of Allowance mailed December 7, 2000, and further to the Amendment Under 37 CFR 1.312 filed January 18, 2001, Applicants have further amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, all of the independent claims (claims 1-3, 5, 7, 9, 11, 13, 15-17, 19, 21, 23, 25-27 and 30), and various of the dependent claims (claims 28 and 31), have been amended to delete recitation of the cassette or wafer storing structure being mounted in air, or a cassette table or wafer storing structure table for mounting the cassette or wafer storing structure being in air; and to recite instead that, e.g., the cassette or wafer storing structure is mounted at a position where an upper region thereof is open to a cassette transferring path (or, correspondingly, the cassette table has an upper region thereover which is open to a cassette transferring path). In connection with this recitation now in the claims with respect to the upper region being open to a cassette transferring path, attention is directed to, for example, Fig. 2. As can be appreciated therefrom, the region above cassette table 2a is open to the transfer robot transferring, e.g., cassette 1a for storing the processed wafers and for recovering processed wafers. Clearly, these amendments to the claims do not constitute new matter.

Applicants respectfully request entry of the present

amendments, under 37 CFR 1.312. It is respectfully submitted that the present amendments are necessary in order for the invention, presently defined, to be defined with sufficient clarity to form an adequate basis for an enforceable contract. In this regard, it is respectfully submitted that the present amendments are necessary in order to clarify the definition of the present invention, to further point out differences in connection with the present invention. It is respectfully submitted that the present amendments further point out differences between the present invention and prior art to the present invention, including prior art previously cited in connection with the present invention (e.g., U.S. Patent No. 4,851,101 to Hutchinson), so as to further define with more clarity the present invention.

Noting, for example, that the present amendments further clarify the definition of the present invention, in each of the independent claims, it is respectfully submitted that the presently amended claims will require no additional search or examination. It is respectfully submitted that the presently amended claims are patentable for reasons by which the claims were previously allowed, and additionally in light of the features added by the present amendments, including wherein the cassettes are mounted at a position of which the upper region of the position is open to the cassette transferring path.

Moreover, it is respectfully submitted that the present amendments are timely. In this regard, note that the claims of the above-identified application were allowed in a first

Office Action on the merits in the above-identified application, and recently pertinence of cited prior art (e.g., U.S. Patent No. 4,851,101 to Hutchinson) was appreciated. It is respectfully submitted that the present amendments constitute Applicants' first opportunity to amend their claims, e.g., subsequent to a full appreciation of various prior art.

In view of the foregoing, it is respectfully submitted that Applicants have made the necessary showing under 37 CFR 1.312; and that, accordingly, entry of the present amendments is clearly proper.

In view of all of the foregoing, entry of the present amendments and of the amendments in the Amendment Under 37 CFR 1.312 filed January 18, 2001, and, subsequently, issuance of a U.S. patent based on the above-identified application in due course, are respectfully requested.

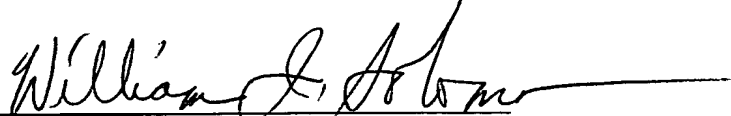
Attached hereto is a marked-up version of the changes made in the claims by the current Amendment. This marked-up version is on the attached pages, the first page of which is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit

Account No. 01-2135 (Case No. 503.30414C14) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

A handwritten signature in dark ink, appearing to read "William I. Solomon", written over a horizontal line.

William I. Solomon
Registration No. 28,565

1300 North Seventeenth Street
Suite 1800
Arlington, VA 22209
Tel.: 703-312-6600
Fax.: 703-312-6666

WIS/slk

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend the claims presently in the application as follows:

1. (Twice Amended) A method of using a conveyor system for processing substrates in plural vacuum processing chamber installation portions, the conveyor system including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing the substrates, the location having an upper region which is open to a cassette transferring path;

a vacuum loader; and

a lock chamber, having an atmospheric loader side and a vacuum loader side, and having a gate valve for said atmospheric loader side and another gate valve for said vacuum loader side,

wherein said vacuum loader has

(1) a transfer chamber connected to the lock chamber via the another gate valve, the method comprising the steps of:

transferring substrates, to be processed, from said atmospheric loader, [exposed to the air] from a cassette at said location, to said lock chamber;

after transferring substrates to the lock chamber, providing a vacuum in said lock chamber;

after providing a vacuum in said lock chamber, transferring substrates to be processed, from said lock chamber to said transfer chamber;

thereafter, transferring processed substrates from said transfer chamber to said lock chamber; and

transferring processed substrates from said lock chamber to said atmospheric loader from which the substrates had been transferred to the lock chamber,

wherein said gate valve and said another gate valve are opened and closed every carrying-in of a substrate, to be processed, to the lock chamber, and every carrying-out a processed substrate from the lock chamber.

2. (Twice Amended) A method of transferring at least one wafer in a vacuum processing apparatus, comprising the steps of:

(i) placing a cassette containing at least one wafer to be processed, at a cassette table, [exposed to the air] the cassette table having an upper region thereover which is open to a cassette transferring path;

(ii) loading said at least one wafer sequentially in order from said cassette, by means of a first conveyor, to a load lock chamber, in which one wafer is to be disposed, and therefrom, by means of a second conveyor, to a transfer chamber under vacuum; and

(iii) after processing the wafers, unloading processed wafers from a plurality of vacuum processing chambers into said cassette at said cassette table, from which the wafers had been loaded, by means of the second conveyor in said transfer chamber under vacuum, an unload lock chamber, in which one wafer is to be disposed, and said first conveyor.

3. (Thrice Amended) A method of transferring cassettes in operating a vacuum processing apparatus having plural vacuum processing chambers, the vacuum processing apparatus including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing samples, the location having an upper region which is open to a cassette transferring path;

a vacuum loader; and

a lock chamber for connecting said atmospheric loader and said vacuum loader, said lock chamber having opening and closing devices for carrying-in [wafers] samples to be processed in the vacuum processing chambers into the lock chamber and for carrying-out processed [wafers] samples from the lock chamber, wherein

said atmospheric loader includes a cassette mount unit located in front of said lock chamber, and

said cassette mount unit has a cassette positioning plane in which all cassettes, containing the samples to be processed [and exposed to the air], are positioned in front of a front wall of said lock chamber, said cassette positioning plane being at said location,

the method comprising a step of:

placing said cassette on and removing said cassette from said cassette mount unit which is in front of said lock chamber while maintaining a surface of the samples substantially horizontal,

wherein the opening and closing devices of the lock

chamber are opened and closed every carrying-in of a wafer, to be processed, to the lock chamber, and every carrying-out of a processed wafer from the lock chamber.

5. (Amended) A method of transferring cassettes in operating a vacuum processing apparatus, the vacuum processing apparatus including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing samples, the location having an upper region which is open to a cassette transferring path;

a vacuum loader: and

a lock chamber for connecting said atmospheric loader and said vacuum loader, wherein

said atmospheric loader includes a cassette mount unit located in front of said lock chamber, and

said cassette mount unit has a cassette positioning plane in which cassettes, containing samples to be processed [and exposed to the air], are positioned in front of a front wall of said lock chamber, said cassette positioning plane being at said location, and

an automatic cassette loader for loading cassettes into the atmospheric loader,

the method comprising a step of:

placing said cassette on and removing said cassette from said cassette positioning plane of said cassette mount unit by said automatic cassette loader, in accordance with data sent from a host control apparatus.

7. (Amended) A method of operating a vacuum processing apparatus, the vacuum processing apparatus including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing samples, the location having an upper region which is open to a cassette transferring path;

a vacuum loader; and

a lock chamber for connecting said atmospheric loader and said vacuum loader, wherein

said atmospheric loader includes a cassette mount unit located in front of said lock chamber,

said cassette mount unit has a cassette positioning plane in which all cassettes, containing samples to be processed [and exposed to the air], are positioned in front of a front wall of said lock chamber, said cassette positioning plane being at said location, and

an automatic cassette loader for loading cassettes into the atmospheric loader,

the method comprising the steps of:

placing said cassette on said cassette positioning plane, in front of said lock chamber, and removing said cassette, by said automatic cassette loader in accordance with data sent from a host control apparatus; and

automatically executing a sample processing in said vacuum processing apparatus, based on processing data.

9. (Twice Amended) A method of operating a vacuum processing apparatus, the vacuum processing apparatus

including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing samples, the location having an upper region which is open to a cassette transferring path;

a vacuum loader; and

a lock chamber for connecting said atmospheric loader and said vacuum loader, said lock chamber having opening and closing devices for carrying-in samples, to be processed, into the lock chamber and for carrying-out processed samples from the lock chamber, wherein

said atmospheric loader includes a cassette mount unit located outside of said lock chamber, and

said cassette mount unit has a cassette positioning plane in which all cassettes, containing samples to be processed, [exposed to the air,] are positioned in front of a front wall of said lock chamber, said cassette positioning plane being at said location,

wherein the method comprises the steps of:

carrying in a sample, disposed under atmospheric pressure, from a cassette, [exposed to the air,] at said location in said cassette positioning plane, positioned in front of the front wall of said lock chamber, into at least one of a plurality of vacuum processing chambers of said vacuum processing apparatus, using said lock chamber;

processing said sample in said at least one vacuum processing chamber; and

carrying out said sample, processed in said at least

one vacuum processing chamber, into said atmospheric pressure, using said lock chamber,

wherein the opening and closing devices of the lock chamber are opened and closed every carrying-in of the sample, to be processed, to the lock chamber, and every carrying-out of the processed sample from the lock chamber.

11. (Twice Amended) A method of operating a vacuum processing apparatus, the vacuum processing apparatus including:

an atmospheric loader, [exposed to the air] having a location for positioning at least one cassette containing samples, the location having an upper region which is open to a cassette transferring path;

a vacuum loader; and

a lock chamber for connecting said atmospheric loader and said vacuum loader, said lock chamber having opening and closing devices for carrying-in samples, to be processed, into the lock chamber and for carrying-out processed samples from the lock chamber, wherein

said atmospheric loader includes a cassette mount unit located outside of said lock chamber, and

said cassette mount unit has a cassette positioning plane in which all cassettes, containing samples to be processed, [exposed to the air,] are positioned in front of a front wall of said lock chamber, said cassette positioning plane being at said location,

wherein the method comprises the steps of:

carrying in a sample, disposed in an atmosphere different than an atmosphere in a plurality of vacuum processing chambers, from a cassette positioned in front of the front wall of the lock chamber, [exposed to the air] at said location, into at least one of said vacuum processing chambers, using said lock chamber;

processing said sample in said at least one vacuum processing chamber; and

carrying out said sample, processed in said at least one vacuum processing chamber, into said atmosphere different from the atmosphere in said at least one vacuum processing chamber, using said lock chamber,

wherein the opening and closing devices of the lock chamber are opened and closed every carrying-in of a sample, to be processed, to the lock chamber, and every carrying-out of a processed sample from the lock chamber.

13. (Thrice Amended) A method of treating a sample in plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, at a position in front of a front wall of a lock chamber, on a cassette table, the cassette [being exposed to the air] table having an upper region thereover which is open to a cassette transferring path, said lock chamber having opening and closing devices for carrying-in samples, to be processed, into the lock chamber and for carrying-out processed samples from the lock chamber;

carrying in the sample into a vacuum processing

chamber, of the plural vacuum processing chambers, using the lock chamber;

processing said sample in said vacuum processing chamber;

carrying out said sample, processed in said vacuum processing chamber, to said cassette, using said lock chamber; and

removing said cassette from the cassette table, wherein the opening and closing devices of the lock chamber are opened and closed every carrying-in of a sample, to be processed, to the lock chamber, and every carrying-out of a processed sample from the lock chamber.

15. (Thrice Amended) A method of treating a sample in plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, on a cassette table, the cassette [being exposed to the air] table having an upper region thereover which is open to a cassette transferring path;

carrying in the sample into a vacuum processing chamber, of the plural vacuum processing chambers, using a lock chamber, in which one sample is to be disposed;

processing said sample in said vacuum processing chamber;

carrying out said sample, processed in said vacuum processing chamber, to said cassette which had contained the sample prior to carrying the sample into the vacuum processing chamber, using said lock chamber, in which one sample is to be

disposed; and

removing said cassette from the cassette table.

16. (Twice Amended) A method of treating a sample, comprising the steps of:

placing a cassette, containing the sample, at a position in a single row in front of a front wall of a lock chamber, on a cassette table, [disposed under a cassette transferring atmospheric pressure] the cassette table having an upper region thereover which is open to a cassette transferring path, said lock chamber having opening and closing devices for carrying-in samples, to be processed, into the lock chamber and for carrying-out processed samples from the lock chamber;

carrying in the sample into a vacuum processing chamber, using the lock chamber;

processing said sample in said vacuum processing chamber; and

carrying out said sample, processed in said vacuum processing chamber, using said lock chamber,

wherein the opening and closing devices of the lock chamber are opened and closed every carrying-in of a sample, to be processed, to the lock chamber, and every carrying-out of the processed sample from the lock chamber.

17. (Thrice Amended) A method of treating a semiconductor wafer in plural vacuum processing chambers, comprising the steps of:

placing a wafer storing structure, containing the semiconductor wafer, at a position in front of a front wall of a lock chamber, on a wafer storing structure table, the wafer storing structure [being exposed to the air] table having an upper region thereover which is open to a wafer storing structure transfer path;

carrying in the semiconductor wafer into a vacuum processing chamber, of the plural vacuum processing chambers, using a lock chamber, in which one semiconductor wafer is to be disposed;

processing said semiconductor wafer in said vacuum processing chamber; and

carrying out said semiconductor wafer, processed in said vacuum processing chamber, to said wafer storing structure which had contained the semiconductor wafer prior to carrying the semiconductor wafer into the vacuum processing chamber, using said lock chamber, in which one semiconductor wafer is to be disposed.

19. (Thrice Amended) A method of treating a semiconductor wafer in plural vacuum processing chambers, comprising the steps of:

placing a wafer storing structure, containing the semiconductor wafer, at a position in front of a front wall of a lock chamber, in which one semiconductor wafer is to be disposed, on a wafer storing structure table, [disposed under a wafer storing structure transferring atmospheric pressure] the wafer storing structure table having an upper region

thereover which is open to a wafer storing structure transfer path;

carrying in the semiconductor wafer into a vacuum processing chamber, of the plural vacuum processing chambers, using the lock chamber;

processing said semiconductor wafer in said vacuum processing chamber; and

carrying out said semiconductor wafer, processed in said vacuum processing chamber, to said wafer storing structure which had contained the semiconductor wafer prior to carrying the semiconductor wafer into the vacuum processing chamber, using said lock chamber, in which one semiconductor wafer is to be disposed.

21. (Thrice Amended) A method of treating a sample in plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, at a position in front of a front wall of a lock chamber, in which one sample is to be disposed, on a cassette table, the cassette being [exposed to the air] set at a position where an upper region thereof is open to a wafer storing structure transfer path;

carrying in the sample into a vacuum processing chamber, of the plural vacuum processing chambers, using the lock chamber, in which one sample is to be disposed, wherein the sample is carried directly from the cassette to the lock chamber;

processing said sample in said vacuum processing

chamber; and

carrying out said sample, processed in said vacuum processing chamber, to said cassette which had contained the sample prior to carrying the sample into the vacuum processing chamber, using said lock chamber, in which one sample is to be disposed.

23. (Thrice Amended) A method of treating a sample in plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, at a position in front of a front wall of a lock chamber, in which one sample is to be disposed, on a cassette table, the cassette being [exposed to the air] set at a position where an upper region thereof is open to a cassette transfer path;

carrying in the sample into a vacuum processing chamber, of the plural vacuum processing chambers, using the lock chamber, in which one sample is to be disposed, wherein the sample is carried directly from the cassette to the lock chamber, samples being transferred from the cassette to the lock chamber;

processing said sample in said vacuum processing chamber; and

carrying out said sample, processed in said vacuum processing chamber, to said cassette from which the sample had been carried into the vacuum processing chamber, using said lock chamber, in which one sample is to be disposed.

25. (Thrice Amended) A method of treating a sample in

plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, at a position in a row in front of a front wall of a lock chamber, on a cassette table, disposed [under a cassette transferring atmospheric pressure] at a position where an upper region thereof is open to a cassette transfer path, said lock chamber having opening and closing devices for carrying-in samples, to be processed, into the lock chamber and for carrying-out processed samples from the lock chamber;

carrying in the sample into a vacuum processing chamber, of the plural vacuum processing chambers, using the lock chamber, whereby the sample is carried into the lock chamber from the cassette;

processing said sample in said vacuum processing chamber; and

carrying out said sample, processed in said vacuum processing chamber, using said lock chamber, whereby the sample is carried out from the lock chamber to the cassette,

wherein the sample is carried from the cassette to the lock chamber in a direction opposite to the direction in which the sample is carried out from the lock chamber to the cassette, and

wherein the opening and closing devices of the lock chamber are opened and closed every carrying-in of the sample, to be processed, to the lock chamber, and every carrying-out of the processed sample from the lock chamber.

26. (Thrice Amended) A method of treating a sample in

plural vacuum processing chambers, comprising the steps of:

placing a cassette, containing the sample, at a position in a row in front of load and unload lock chambers, the load and unload lock chambers being separate chambers, the cassette being placed on a cassette table, disposed [under a cassette transferring atmospheric pressure] at a position where an upper region thereof is open to a cassette transfer path, each of the load and unload lock chambers having opening and closing devices for carrying-in a sample to be processed in a vacuum processing chamber to the load lock chamber and for carrying-out a processed sample from the unload lock chamber;

carrying in the sample into a vacuum processing chamber, of the plural vacuum processing chambers, using the load lock chamber;

processing said sample in said vacuum processing chamber; and

carrying out said sample, processed in said vacuum processing chamber, using said unload lock chamber,

wherein the opening and closing devices of the load lock chamber are opened and closed every carrying-in of a sample, to be processed, to the load lock chamber, and every carrying-out of a processed sample from the unload lock chamber.

27. (Amended) A transfer method in operating a vacuum processing apparatus, the vacuum processing apparatus including:

a transfer chamber connected to plural vacuum processing chambers in which substrates to be processed are vacuum processed one-by-one;

a cassette table for mounting [in air] a cassette which receives plural substrates to be processed or substrates having been processed, said cassette being mounted at a position where an upper region thereof is open to a cassette transfer path;

a load lock chamber and an unload lock chamber, for carrying in and carrying out said substrates to be processed or said substrates having been processed, from and to said cassette [in the air] mounted at said position, and for carrying in and carrying out said substrates to be processed or said substrates having been processed, from and to any of said vacuum processing chambers through said transfer chamber;

one atmospheric transfer apparatus for transferring said substrates to be processed or said substrates having been processed between said cassette [in the air] mounted at said position and said load lock chamber and said unload lock chamber; and

gate valves provided respectively at an atmospheric side and a vacuum side of said load lock chamber and said unload lock chamber and for opening and closing at every carry-in and carry-out time, one by one, of said substrates to be processed or said substrates having been processed so as to change over said load lock chamber and said unload lock chamber in an atmospheric atmosphere or a vacuum atmosphere;

wherein the transfer method comprises:

carrying in and carrying out said substrates to be processed or said substrates having been processed, one-by-one, between said load lock chamber or said unload lock chamber at said atmospheric atmosphere and said cassette [in the air] mounted at said position.

28. (Amended) The transfer method according to claim 27, including the further step of carrying in and carrying out said substrates to be processed or said substrates having been processed, one-by-one, between said load lock chamber or said unload lock chamber in the vacuum atmosphere and said cassette [in the air] mounted at said position.

30. (Amended) A transfer method in operating a vacuum processing apparatus, the vacuum processing apparatus including:

a transfer chamber connected to plural vacuum processing chambers in which substrates to be processed are vacuum processed one-by-one;

a cassette table for mounting [in air] a cassette which receives plural substrates to be processed or substrates having been processed, the cassette being mounted at a position where an upper region thereof is open to a cassette transfer path;

a load lock chamber for carrying in said substrates to be processed from said cassette [in the air] mounted at said position and for carrying out said substrates to be processed to any of said vacuum processing chambers through

said transfer chamber;

an unload lock chamber for carrying in said substrates having been processed from any of said vacuum processing chambers through said transfer chamber and for carrying out said substrates having been processed to said cassette [in the air] mounted at said position;

one atmospheric transfer apparatus for transferring said substrates to be processed or said substrates having been processed between said cassette [in the air] mounted at said position and said load lock chamber and said unload lock chamber; and

gate valves provided respectively at an atmospheric side and a vacuum side of said load lock chamber and said unload lock chamber and for opening and closing at every carry-in and carry-out time, one-by-one of said substrates to be processed or said substrates having been processed so as to change over said load lock chamber or said unload lock chamber in an atmospheric atmosphere or a vacuum atmosphere,

wherein the transfer method comprises:

carrying in and carrying out said substrates to be processed or said substrates having been processed, one-by-one, between said load lock chamber or said unload lock chamber in the atmospheric atmosphere and said cassette [in the air] mounted at said position.

31. (Amended) The transfer method according to claim 30, including the further step of carrying in and carrying out said substrates to be processed or said substrates having been

processed, one-by-one, between said load lock chamber or said unload lock chamber in the vacuum atmosphere and said cassette [in the air] mounted at said position.